

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

**RECEIVED**  
**CENTRAL FAX CENTER****JAN 08 2007****REMARKS**

The following remarks are made in response to the Office Action mailed October 6, 2006. In the Office Action, claims 3-7, 10-17 and 19 were rejected and claims 20-22 have been allowed while claims 8-9 and 18 were objected to. With this Response, claims 5, 8-9, 17-18 have been cancelled without prejudice, claims 3-4, 6-7, 11-12, 16, and 19 have been amended, and new claims 23-24 are added. Accordingly, claims 3-4, 6-7, 10-16, and 19-24 are pending in the application and are presented for reconsideration and allowance.

**Claim Rejections under 35 U.S.C. § 103**

In the Office Action, claims 3-4, 7, 10-13, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beaman et al. U.S. Patent 5,738,531 (the Beaman Patent) in view of Bonnefoy U.S. Patent 4,611,869 (the Bonnefoy Patent).

In the Office Action, it was asserted that insulator 23 is a spring member (in regard to independent claims 3, 11, and 16) when nothing in the Beaman Patent appears to indicate or hint that insulator 23 carries the function, shape, size, etc of a spring member, as recited in Applicants' claim 3. In particular, the Beaman Patent discloses that the insulator 23 is installed from the back side of printed circuit board 21, typically composed of a polyamide, to avoid shorting of adjacent land, vias, or other conductive elements. See the Beaman Patent at Column 4, lines 54-55. The Beaman Patent provides the insulator 23 at the back side of printed circuit board because backing plate 19 is metallic and therefore an electrical conductor, but not to act as a spring member that exerts a compressive force against a second side of the printed circuit board, as claimed by Applicants in independent claim 3.

Moreover, the Beaman Patent provides two instances in which insulator 23 would be unnecessary, and therefore not included in the assembly of the Beaman Patent, which further indicates that the insulator 23 of the Beaman Patent does not act as a spring. In one example, if the backing plate 19 is nonconductive, insulator 23 is unnecessary. In another example, if the underside of circuit board 21 at the location of backing plate 19 has no conductive paths, then insulator 23 is not needed. See the Beaman Patent at Column 4, lines 54-62. Accordingly, because insulator 23 is described in association with functions having nothing to do with force distribution or with applying a compressive force and because insulator 23 is not a required component of the assembled device of the Beaman Patent, it is not appropriate

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

to designate the insulator 23 as a spring member in applying the Beaman Patent against Applicants' independent claim 3.

In addition, the other remaining structures in the Beaman Patent teach one skilled in the art away from viewing insulator 23 a spring and/or away from replacing insulator 23 with clip 22, 23 of the Bonnefoy Patent (as further addressed below). In particular, in the Beaman Patent, screw actuator 29 and swivel plate 34 (in combination with slide plate 33) are used to apply a load to compress module 28 relative to circuit board 21. See the Beaman Patent at Column 5, lines 35-67 and Column 6, lines 12-20. Accordingly, these passages in combination with Figures 5-6 of the Beaman Patent make it apparent that insulator 23 plays no role as a compressive force, and therefore cannot be considered a "spring member", as claimed by Applicants in independent claim 3.

To this end, Applicants note that the assertion in the Office Action that "the insulator [23] being flex and reduce force that applied between the board and plate, so that insulator (23) has a structure as a spring member" is in contradiction to the customary and ordinary meaning of the term "spring". For instance, as provided by Merriam Webster on-line dictionary ([www.merriam-webster.com](http://www.merriam-webster.com) 2006), the term "spring" (noun) includes the definition of "an elastic body or device that recovers its original shape when released after being distorted" while the source Wikipedia ([www.wikipedia.org](http://www.wikipedia.org) 2006) includes the definition of "spring" (device) as "a flexible elastic object used to store mechanical energy". These meanings are consistent with Applicants' use of the term "spring member" in independent claim 3 as being "biased to exert a compressive force against the center of the printed circuit board."

There is no indication, anywhere within the Beaman Patent, nor within the ordinary meaning of the term "spring" in this context, that insulator 23 bears the property of "storing mechanical energy" to enable "exerting a compressive force", as claimed by Applicants in independent claim 3. Accordingly, the assertion of insulator 23 in the Office Action as a "spring member" is misplaced. In addition, as previously explained above, there is no basis in the Beaman Patent that would lead one skilled in the art to add a second compressive element in place of insulator 23 in addition to first compressive element already provided in the Beaman Patent (e.g., screw actuator 29, swivel plate 34, and slide plate 33) for applying a compressive force to module 28 and circuit board 21.

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

In addition to these deficiencies, the Beaman Patent fails to disclose a first outer portion of a curved spring member being in contact with the backing plate (with the backing plate also spaced from a second side of the printed circuit board) and spaced from the second side of the printed circuit board in an assembled state of the system, as recited in Applicants' amended independent claim 3. Accordingly, in the Office Action, it was admitted that the Beaman Patent does not disclose the spring member (23) being curved and [in] pressing contact against the second side of the printed circuit board adjacent a center of the printed circuit board, and the curved spring member retaining a generally curved shape in both an unassembled state of the system and an assembled state of the system.

The Bonnefoy Patent fails to cure these deficiencies of the Beaman Patent regarding Applicants' amended independent claim 3. The Bonnefoy Patent discloses clip 22 and clip 23 which are in a cambered form (i.e. a curved shape) as illustrated in Figures 4-5 prior to achieving the clamped/assembled state shown in Figure 3 (see the Bonnefoy Patent at Figures 4-5, and Column 4, lines 8-62). As shown in Figure 3, in the clamped state, substantially all, or all, of the clip 22 is in contact against element 29 and/or substantially all or all of clip 23 is in contact against element 20. In other words, in the clamped/assembled state shown in Figure 3 of the Bonnefoy Patent, the clip 22,23 becomes flat with no portion of the clip 22, 23 spaced from element 29.

To this end, the Bonnefoy Patent identifies the goal of bringing a clamping means (i.e., clip 22, 23) into form of the line taken by a group of superimposed elements (i.e., elements 11, 13). See the Bonnefoy Patent at Column 3, lines 7-11. In practice, "deformation of clip (22) exercised by the force means (24) finally to give it the rectilinear form of alignment of elements (11) and (13) provides a uniform clamping of all the elements (11, 13) of each pair between the clips". See the Bonnefoy Patent at Column 4, lines 38-43. As described in Column 4 of the Bonnefoy Patent, the difference between Figures 4 and 5 relate not to the appearance of a final assembled state of a clamping device 10 but rather to the differences between having only one or both of clips 22, 23 having a cambered form prior to the final, assembled state shown in Figure 3, in which both clips 22,23 have a rectilinear or flat form.

Accordingly, the Bonnefoy Patent teaches away from Applicant's claim 3 which includes a first outer portion of the spring member being in contact with the backing plate

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

(with the backing plate spaced apart from the second side of the printed circuit board) and the first outer portion of the curved spring member spaced from the second side of the printed circuit board in an assembled state of the system, as recited in Applicant's amended independent claim 3.

In addition, in the clamped/assembled state shown in Figure 3 of the Bonnefoy Patent, no portion of clip 22,23 is curved or cambered. Accordingly, this arrangement in the Bonnefoy Patent, teaches away from Applicant's independent claim 3 which includes the limitation that the curved spring member retains a generally curved shape in an assembled stated of the system, as recited in Applicants' independent claim 3.

Finally, the Bonnefoy Patent fails to disclose a backing plate at all that is spaced apart from a second side of a printed circuit board, and therefore the Bonnefoy Patent also fails to indicate how one would employ the clip 22, 23 in cooperation with a backing plate in which the backing plate is spaced from a second side of a printed circuit board, as claimed by Applicants in claim 3.

Accordingly, one cannot combine the Beaman Patent and the Bonnefoy Patent and arrive at Applicants' amended independent claim 3.

Moreover, one skilled in the art would not even look to the Bonnefoy Patent in an attempt to modify the Beaman Patent because a combination of the Beaman Patent and the Bonnefoy Patent would require much more than substituting one alleged spring member (the insulator 23) for another alleged spring member (e.g., clip 22,23) but instead replacing an insulator 23 having no spring or compressive functions with an alleged spring member (e.g., clip 22, 23) for applying a compressive force. Moreover, as identified above, the Beaman Patent already includes its own mechanism (e.g., screw actuator 29, swivel plate 34, and slide plate 33) for applying a compressive force and uniformly distributing forces, thereby making the replacement of insulator 23 with clip 22, 23 of the Bonnefoy Patent to be unnecessary and superfluous.

Finally, because the Bonnefoy Patent fails to address whether its clips 22 are metallic or not, the Beaman Patent apparently does not provide an insulative function and therefore the replacement of the clips 22 of the Bonnefoy Patent for the insulator 23 of the Beaman Patent could potentially make the assembly of the Beaman Patent inoperable when the backside of the printed circuit board of the Beaman Patent includes conductive paths or is

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

made of an electrical conductor (as described in the Beaman Patent). For these additional reasons, one skilled in the art would not attempt to combine the Beaman Patent and the Bonnefoy Patent.

For these reasons, the Beaman Patent and the Bonnefoy Patent, alone or in combination, fail to teach or suggest Applicants' amended independent claim 3, and therefore Applicants' amended independent claim 3 is patentable and allowable over the Beaman Patent and the Bonnefoy Patent. Dependent claims 4, 7, and 10 are believed to be allowable as they further define patentably distinct independent claim 3.

Applicants' amended independent claim 11 claims a force distributing mechanism.

For substantially the same reasons previously presented for the patentability of Applicants' independent claim 3, the Beaman Patent fails to disclose that insulator 23 comprises a spring member and, as admitted in the Office Action, additionally fails to disclose a spring member being curved and in pressing contact against the second side of the printed circuit board at a center of the printed circuit board, as admitted in the Office Action regarding Applicants' independent claim 11.

Accordingly, the Beaman Patent fails to disclose a means for maintaining and distributing a contact force substantially uniformly across a contact array of a land grid array module and a contact array of a printed circuit board, wherein in an assembled state of the land grid array module and the printed circuit board, the means for maintaining and distributing the contact force is in direct pressing contact with the printed circuit board at a center portion of the printed circuit board relative to the land grid array module, as recited in Applicants' amended independent claim 11.

In addition, the Beaman Patent fails to disclose that the means for maintaining and distributing the contact force is spaced from a second side of the printed circuit board at an outer portion of the printed circuit board relative to the land grid array module (in the assembled state of the land grid array module and the printed circuit board), as recited in Applicants' amended independent claim 11.

For substantially the same reasons as previously presented for the patentability of Applicant's independent claim 3, the Bonnefoy Patent fails to cure these deficiencies of the Beaman Patent regarding Applicants' amended independent claim 11. In particular, Figure 3

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

of the Bonnefoy Patent illustrates a clamped/assembled state in which the clip 22,23 becomes flat with no portion of the clip 22, 23 spaced from element 29. Accordingly, the Bonnefoy Patent teaches away from Applicants' limitation in claim 11 of a means for maintaining and distributing the contact force that is spaced from the printed circuit board at an adjacent outer portion of the printed circuit board relative to the land grid array module (in the assembled state of the land grid array module and the printed circuit board).

For these reasons and the reasons previously presented in favor of the patentability of claim 3, one cannot combine the Beaman Patent and the Bonnefoy Patent to arrive at Applicants' independent claim 11 and therefore, the Beaman Patent and the Bonnefoy Patent, alone or in combination, fail to teach or suggest Applicants' amended independent claim 11. Accordingly, Applicants' amended independent claim 11 is patentable and allowable over the Beaman Patent and the Bonnefoy Patent. In addition, dependent claims 12-14 are also believed to be allowable as they further define patentably distinct independent claim 11.

Applicants' independent claim 16 claims a method of distributing a contact force between a land grid array module and a printed circuit board.

For substantially the same reasons previously presented for the patentability of Applicant's independent claim 3, the Beaman Patent fails to disclose that insulator 23 of the Beaman Patent comprises a spring member as recited in the limitations of Applicants' independent claim 16. In addition to failing to disclose that insulator 23 comprises a spring member, the Office Action (regarding claims 3, 11, and 16) admits that the Beaman Patent fails to disclose a spring member being curved and in pressing contact against the second side of the printed circuit board adjacent a center of the printed circuit board.

In addition to failing to disclose insulator 23 as a spring member, the Beaman Patent also fails to disclose positioning a first outer portion of a spring member in contact with the backing plate (with the backing plate spaced apart from a second side of the printed circuit board) and spaced from the second side of the printed circuit board in an assembled state of the land grid array module, the printed circuit board, and the spring member, as recited in Applicant's independent claim 16.

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

For substantially the same reasons as previously presented for the patentability of Applicant's independent claim 3, the Bonnefoy Patent fails to cure these deficiencies of the Beaman Patent regarding Applicants' amended independent claim 16. Accordingly, the Bonnefoy Patent does not disclose a first outer portion of a spring member in contact with a backing plate and the first outer portion of the spring member spaced from the printed circuit board in an assembled state of the land grid array module, the printed circuit board, and the spring member, and wherein a second central portion of the spring member is in pressing direct contact against the second side of the printed circuit board and biased to exert a compressive force against the center of the printed circuit board, as recited in Applicant's amended independent claim 16.

In addition for the reasons previously presented for the patentability of Applicants' claim 3, the Bonnefoy Patent teaches away from Applicant's independent claim 16 which includes the limitation that the curved spring member retains a generally curved shape in an assembled stated of the system.

For these reasons, one cannot combine the Beaman Patent and the Bonnefoy Patent to arrive at Applicants' independent claim 16 and therefore, the Beaman Patent and the Bonnefoy Patent, alone or in combination, fail to teach or suggest Applicants' amended independent claim 16. Accordingly, Applicants' amended independent claim 16 is patentable and allowable over the Beaman Patent and the Bonnefoy Patent. Dependent claim 19 is also believed to be allowable as it further defines patentably distinct independent claim 16.

In the Office Action, claims 15 and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Beaman Patent in view of the Bonnefoy Patent and further in view of Haselby et al. U.S. Patent 6,299,460 (the Haselby Patent).

First, dependent claim 15 is believed to be allowable because claim 15 further defines patentably distinct independent claim 11 (via intervening claim 12), which is patentable and allowable for the reasons previously presented. Dependent claim 17 has been cancelled.

In the Office Action, claims 5-6 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over the Beaman Patent (the Beaman Patent) in view of the Bonnefoy Patent, and further in view of Sinha et al. U.S. Patent 6,475,011 (the Sinha Patent).

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

Dependent claim 5 has been cancelled.

Dependent claim 6 is believed to be allowable because it further defines patentably distinct independent claim 3, which is patentable and allowable for the reasons previously presented. Moreover, independent claim 3 from which claim 6 depends, includes the limitation that a convexity of the second central portion of the curved spring member faces a second side of the printed circuit board. This arrangement is a direct opposite of the arrangement in the Sinha Patent in which spring plates 272 have a convexity facing away from lower surface 217 of printed wiring board 215. See Figure 2B of the Sinha Patent. In addition, a portion of the spring plates 272 adjacent hole 278 of spring plates 272 (Figure 5) are not in pressing contact against lower surface 217 of printed wiring board 215 (see Figure 2B of the Sinha Patent). Instead, a spring actuator assembly 240 makes contact with lower surface 217 of printed wiring board 215. See Figure 2B of the Sinha Patent.

In contrast, Applicants' independent claim 3 (from which claim 6 depends) includes the limitation of the second central portion of the curved spring member being in pressing, direct contact against the second side of the printed circuit board.

Applicants further note that the Sinha Patent discloses a pin opening 280 on the corners of each spring plate 272, which is contained (via retention clips 254) on pins 256 of load transfer plate 250 instead of load posts 220 as illustrated in Figure 2B of the Sinha Patent whereas in direct contrast, in Applicants' independent claim 3, the first outer portion of the curved spring member is slidably mounted on the respective posts (that extend between the respective land grid array module, printed circuit board, interposer, curved spring member).

For these reasons, the Sinha Patent fails to teach or suggest Applicants' independent claim 3, and therefore also fails to teach or suggest Applicants' dependent claim 6, depending from patentably distinct independent claim 3.

Dependent claim 14 is believed to be allowable because claim 14 further defines patentably distinct independent claim 11, which is patentable and allowable for the reasons previously presented.



**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

---

In light of the above, Applicants respectfully request withdrawal of the above rejections of claims 3-4, 6-7, 10-16, and 19 under 35 U.S.C. §103 and respectfully request allowance of these claims.

**Allowable Subject Matter**

In the Office Action, claims 8-9, and 18 were objected to for being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all limitations of the base claim and any intervening claims and if rewritten to overcome the 35 U.S.C. §112 rejections.

Applicants have cancelled claims 8-9 and 18 in view of the allowance of independent claims 20 (and claim 21 depending therefrom) and 22, which generally correspond to the subject matter of claims 8-9, and 18, respectively.

**New Claims 23-24**

Applicants present new claims 23 and 24, which depend from allowable claim 22. Accordingly, Applicants respectfully submit that new claims 23 and 24 are allowable as well based on their dependency from patentably distinct independent claim 22.

RECEIVED  
CENTRAL FAX CENTER

JAN 08 2007

**Amendment and Response**

Applicant: Daniel Lyle Callahan et al.

Serial No.: 10/615,011

Filed: July 8, 2003

Docket No.: 200308561-1

Title: FORCE DISTRIBUTING SPRING ELEMENT

**CONCLUSION**

In view of the above, Applicants respectfully submit that pending claims 3-4, 6-7, 10-16, and 19-24 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 3-4, 6-7, 10-16, and 19-24 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 08-2025.

The Examiner is invited to contact the Applicants' representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to either Paul S. Grunzweig at Telephone No. (612) 767-2504, Facsimile No. (612) 573-2005 or David A. Plettner at Telephone No. (408) 447-3013, Facsimile No. (408) 447-0854. In addition, all correspondence should continue to be directed to the following address:

IP Administration  
Legal Department, M/S 35  
HEWLETT-PACKARD COMPANY  
P.O. Box 272400  
Fort Collins, Colorado 80527-2400

Respectfully submitted,  
Daniel Lyle Callahan et al.  
By their attorneys,  
DICKE, BILLIG & CZAJA, PLLC  
Fifth Street Towers, Suite 2250  
100 South Fifth Street  
Minneapolis, MN 55402  
Telephone: (612) 767-2504  
Facsimile: (612) 573-2005

Date: 8 January 2007  
PSG:cms

Paul S. Grunzweig  
Paul S. Grunzweig  
Reg. No. 37,143

**CERTIFICATE OF FACSIMILE TRANSMISSION**

The undersigned hereby certifies that this paper or papers, as described herein, are being transmitted by facsimile to the U.S. Patent and Trademark Office, Fax No. (571) 273-8300 on this 8th day of January, 2007.

By Paul S. Grunzweig  
Name: Paul S. Grunzweig